

### Trend Study 18A-23-07

Study site name: South Palmer Point.

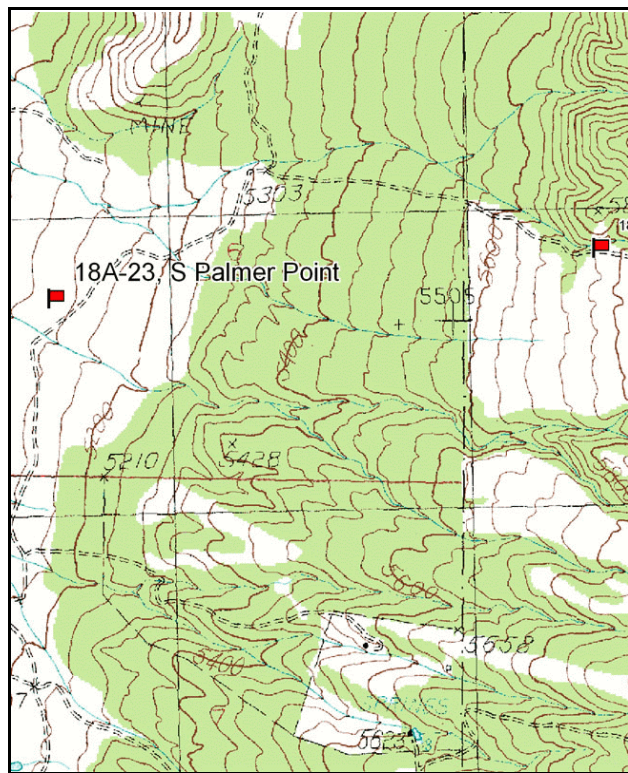
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 14 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

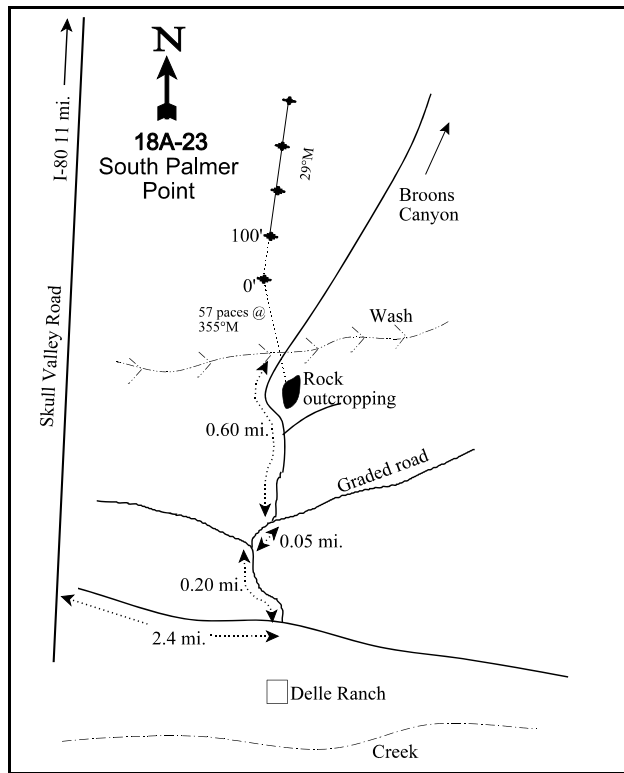
### LOCATION DESCRIPTION

From I-80, proceed south on Skull Valley Road for 11 miles. Turn east of a dirt road (between mile posts 24 and 25) and continue along this road for 2.4 miles to Delle Ranch. From the creek crossing on the road at Delle Ranch, proceed north towards Broons Canyon for 0.20 miles to an intersection. Go east for 0.05 miles to another intersection. Turn left, and go north 0.60 miles until you reach a rock outcropping on the right hand side of the road. From the base of the rock outcropping, walk 57 paces at an azimuth of 355 degrees magnetic (across the road and a dry wash), to the 0-foot baseline stake. The baseline runs at an azimuth of 29 degrees magnetic, and is marked by green steel "T" fenceposts approximately 12 to 19 inches high. The 0-foot baseline stake has a red browse tag, number 3984, attached.



Map Name: Salt Mountain

Township 3S, Range 7W, Section 6



Diagrammatic Sketch

GPS: NAD 83, UTM 12T 357520 E 4493900 N

## DISCUSSION

### South Palmer Point - Trend Study No. 18A-23

#### Study Information

This study monitors deer winter range dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and Utah juniper (*Juniperus osteosperma*) [elevation: 5,100 feet (1,554 m), slope: 5%, aspect: west]. This land is administered by the Bureau of Land Management. The study was sampled in the summer of 2004 to assess pre-treatment conditions, and in November 2004, 780 acres (316 ha) surrounding the study were aerially seeded with sagebrush and perennial grasses and forbs as part of the Round Canyon treatment (Table 1). After the seeding, bullhogs were used to reduce the density of junipers. Deer use was light-moderate in 1997, with some light cattle use also evident. Pellet group data indicated 23 deer days use/acre (57 ddu/ha) in 2002, 13 days use/acre (31 ddu/ha) in 2004, and 14 days use/acre (35 ddu/ha) in 2007.

#### Soil

The soil is classified within the Abela series (USDA-NRCS 2007). Soils in this series are deep and well-drained. The parent material consists of a combination of limestone, sandstone, and quartzite, which were alluvially deposited from the canyon to the east. The soil texture is a loam with a moderately alkaline reaction (pH 7.9). The soil phosphorus is low at 3.4 ppm. Values less than 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Relative bare ground cover has ranged from 9% to 17% since 1997. Protective ground cover is abundant enough to prevent most erosion. The erosion condition was stable in 2002 and 2007.

#### Browse

Wyoming big sagebrush is the primary browse species, and its cover has fluctuated between 10% and 12% since 1997. Previous to the bullhog treatment, density estimates ranged from 966 plants/acre (2,386 plants/ha) to 3,820 plants/acre (9,435 plants/ha). Density increased dramatically following the treatment, from 2,840 plants/acre (7,015 plants/ha) in 2004 to 7,200 plants/acre (17,791 plants/ha) in 2007. Decadence reached a peak of 83% in 1989, and declined to 8% by 2007. Recruitment was good in 1997, with 40% of the population consisting of young plants, but recruitment decreased to 7% by 2004. Following the bullhog treatment, young recruitment was high, constituting 65% of the population. Dead plants were abundant when they were first sampled in 1997, indicating that a die-off occurred in the past. Post-treatment data show a 57% decrease in dead plant abundance from 2004 to 2007. Vigor has been good on the majority of plants since 1997. Use was moderate-heavy in 1983, moderate in 1989, and light from 1997 to 2007. Annual leader growth averaged 3.4 inches (8.6 cm) in 2002 and 2004, but decreased to 1.4 inches (3.6 cm) in 2007.

Total canopy cover of Utah juniper increased from 5% in 1997 to 13% in 2004. Juniper cover decreased to 4% in 2007 following treatment. Density in 2002 and 2004 was 72 and 73 trees/acre (178 and 180 trees/ha), respectively, but the treatment only reduced the density to 68 trees/acre (168 trees/ha). Average tree diameter decreased from 12.3 inches (31.2 cm) in 2004 to 6.4 inches (16.3 cm) in 2007. The broom snakeweed (*Gutierrezia sarothrae*) population decreased from 2,600 plants/acre (6,425 plants/ha) in 2002 to 460 plants/acre (1,137 plants/ha) in 2004. This population increased to 860 plants/acre (2,125 plants/ha) in 2007.

#### Herbaceous Understory

The most common grasses are Sandberg bluegrass (*Poa secunda*) and cheatgrass (*Bromus tectorum*). Other grasses, such as bluebunch wheatgrass (*Agropyron spicatum*) and bottlebrush squirreltail (*Sitanion hystrix*) occur infrequently. Perennial grass cover has remained relatively stable at 7%-9% since 1997, while cheatgrass cover has increased from 9% in 1997 to 13% in 2002 and 18% in 2007. It comprised two-thirds of the total grass cover in 2007. This fine-fuel cover is high enough to create a potential fire hazard. The majority of forbs present are low growing species of rather poor forage value. However, western yarrow (*Achillea millefolium*), Lewis flax (*Linum lewisii*), and alfalfa (*Medicago sativa*) were seeded in 2004 and were

first sampled in 2007. These species provide excellent forage for wildlife and livestock.

#### 1989 TREND ASSESSMENT

The trend for browse is down. Sagebrush density decreased from 2,399 plants/acre (5,928 plants/ha) to 966 plants/acre (2,387 plants/ha). The plants classified with poor vigor increased from 47% to 72% of the population. Decadence also increased from 47% to 83%. Browse use decreased from heavy to moderate. The trend for grass is up. Sandberg bluegrass increased significantly in nested frequency, and the sum of nested frequency of perennial grasses increased by 55%. The trend for forbs is slightly up. The sum of nested frequency of perennial forbs increased, but many of the species present are weedy.

browse - down (-2)

grass - up (+2)

forb - slightly up (+1)

#### 1997 TREND ASSESSMENT

The trend for browse is up. The density of sagebrush increased from 966 plants/acre (2,387 plants/ha) to 2,420 plants/acre (5,980 plants/ha). Decadence decreased from 83% to 20%, and young recruitment increased from 7% to 40%. Plants classified as having poor vigor declined from 72% to 11% of the population. Moderately hedged plants decreased from 83% to 14%. The trend for grass is stable. There was no significant change in the nested frequencies of perennial grasses. Cheatgrass accounted for 50% of the total grass cover and 41% of the total herbaceous cover. The trend for forbs is stable. The majority of the forb cover is derived from annuals and weedy species. One of the most common forb species is bur buttercup (*Ranunculus testiculatus*), which is an allelopathic annual (Buchanan et al. 1978). The Desirable Components Index (DCI) was rated as good due to favorable browse cover and an understory composed of some perennial grasses, but low cover of perennial forbs.

winter range condition (DCI) - good (54) Low potential scale

browse - up (+2)

grass - stable (0)

forb - stable (0)

#### 2002 TREND ASSESSMENT

The trend for browse is up. Sagebrush density increased from 2,420 plants/acre (5,980 plants/ha) to 3,820 plants/acre (9,439 plants/ha). Percent decadence decreased, and young plants remained abundant at 24% of the population. Vigor was good, and utilization remained light. Juniper canopy cover increased from 5% to 11%, and may warrant treatment in the future. The trend for grass is stable. The nested frequencies of perennial grasses and cheatgrass did not change significantly. The trend for forbs is down. These species were fairly diverse, but produced less than 2% total cover. The sum of nested frequency of perennial forbs decreased by 62% since 1997. The DCI was rated as fair-good due to the decrease in forb cover.

winter range condition (DCI) - fair-good (43) Low potential scale

browse - up (+2)

grass - stable (0)

forb - down (-2)

#### 2004 TREND ASSESSMENT

The trend for browse is down. Sagebrush density decreased 26%, and decadence increased from 19% to 26%. Young recruitment was high in 1997 and 2002, but decreased to 7% of the population in 2004. Utilization remained light, and only 11% of the plants displayed poor vigor. Juniper canopy cover continued to increase from 11% to 13%. The trend for grass is slightly down. Cheatgrass remained abundant, although its cover changed little since 2002. The sum of nested frequency for perennial grasses decreased 13%. Perennial grass cover also decreased from 9% to 7%. The trend for forbs is slightly down. The sum of nested frequency for annual forbs slightly increased, and storksbill nested frequency increased significantly. Storksbill has been shown to outcompete and prevent the establishment of native species (Kimball and Schiffman 2003). Forb cover remained less than 2% and provided very little forage. The DCI was rated as fair due to increased decadence and decreased recruitment of preferred browse, cheatgrass abundance, and low forb cover.

winter range condition (DCI) - fair (28) Low potential scale

browse - down (-2)

grass - slightly down (-1)

forb - slightly down (-1)

### 2007 TREND ASSESSMENT

The trend for browse is up. Sagebrush density increased from 2,640 plants/acre (6,523 plants/ha) to 7,200 plants/acre (17,790 plants/ha) following the 2004 seeding. The majority of this increase was attributed to young plants, which increased in density from 180 plants/acre (445 plants/ha) to 4,700 plants/acre (11,614 plants/ha). The proportion of young plants in the population increased from 7% to 65%. Seedlings were also sampled for the first time since 1997 at a density of 7,200 seedlings/acre (17,790 seedlings/ha). Decadence decreased from 28% of the population to 8%, and vigor improved. Due to the treatment, juniper canopy cover decreased from 13% to 4%. The trend for grass is stable. There was a significant increase in the nested frequency of cheatgrass, while the nested frequencies of perennial grasses did not change significantly. However, the sum of nested frequency for perennial grasses increased 12%. The trend for forbs is up. Perennial forbs such as western yarrow, Lewis flax, and alfalfa were established due to the seeding. The sum of nested frequency for perennial forbs increased dramatically. Total forb cover increased from 2% to 9%. The DCI was rated as good due to increases in preferred browse and perennial forb cover.

winter range condition (DCI) - good (55) Low potential scale

browse - up (+2)

grass - stable (0)

forb - up (+2)

**Table 1.** Seed mix applied to the South Palmer Point study in 2004.

<b>Round Canyon Seed Mix</b>	
Seeded Species	Approximate Bulk lbs/acre
Siberian Wheatgrass "Vavilov"	2.00
Russian Wildrye "Bozoski"	2.00
Western Wheatgrass "Arriba"	2.00
Lewis Flax	1.00
Western Yarrow	0.25
Alfalfa "Ladak"	0.50
Total	7.75

HERBACEOUS TRENDS --

Management unit 18A, Study no: 23

Type	Species	Nested Frequency						Average Cover %			
		'83	'89	'97	'02	'04	'07	'97	'02	'04	'07
G	Agropyron cristatum	-	-	-	-	-	7	-	-	-	.22
G	Agropyron spicatum	ab12	a6	ab11	ab21	ab19	b26	.61	.93	1.27	1.61
G	Aristida purpurea	-	-	-	3	-	-	-	.03	-	-
G	Bromus tectorum (a)	-	-	a308	a301	a308	b347	8.61	12.80	12.14	18.24
G	Poa secunda	a160	c244	bc224	bc236	ab195	abc200	7.65	7.92	4.84	6.17
G	Sitanion hystrix	a9	ab31	ab21	ab10	ab21	b30	.29	.39	.75	.80
G	Vulpia octoflora (a)	-	-	-	-	-	2	-	-	-	.00
Total for Annual Grasses		0	0	308	301	308	349	8.61	12.80	12.14	18.24
Total for Perennial Grasses		181	281	256	270	235	263	8.56	9.28	6.86	8.82
Total for Grasses		181	281	564	571	543	612	17.17	22.09	19.01	27.07
F	Achillea millefolium	-	-	-	-	-	15	-	-	-	.36
F	Agoseris glauca	-	-	-	a1	-	a3	-	.00	-	.00
F	Alyssum alyssoides (a)	-	-	-	-	-	27	-	-	-	.18
F	Allium sp.	-	-	-	-	-	3	-	-	-	.00
F	Antennaria rosea	ab12	ab18	a5	a6	-	b27	.06	.19	-	.51
F	Astragalus cibarius	a9	a12	b36	-	a5	-	1.39	-	.01	-
F	Astragalus lentiginosus	-	-	-	-	-	23	-	-	-	.72
F	Astragalus utahensis	a7	a13	a15	a1	a1	a7	.23	.00	.00	.19
F	Castilleja chromosa	a3	-	-	-	-	a2	-	-	-	.03
F	Calochortus nuttallii	ab11	ab19	ab10	a4	a6	b27	.03	.01	.01	.10
F	Chaenactis douglasii	a1	a4	a8	-	-	-	.02	-	-	-
F	Cirsium undulatum	ab5	ab2	b10	-	-	a1	.13	-	-	.00
F	Comandra pallida	-	-	a3	a6	a4	a4	.01	.03	.03	.03
F	Collinsia parviflora (a)	-	-	a4	a3	-	-	.01	.00	-	-
F	Cryptantha sp.	-	3	-	-	-	-	-	-	-	-
F	Delphinium nuttallianum	-	-	-	-	1	-	-	-	.00	-
F	Draba sp. (a)	-	-	-	4	-	-	-	.00	-	-
F	Erodium cicutarium (a)	-	-	a1	a11	b28	b30	.03	.25	.39	.70
F	Holosteum umbellatum (a)	-	-	b34	ab18	a5	c153	.31	.09	.01	2.01
F	Lathyrus brachycalyx	a10	a24	-	-	-	a10	-	-	-	.25
F	Lactuca serriola	-	a7	a8	-	-	a20	.04	-	-	.07
F	Linum lewisii	-	-	-	-	-	53	-	-	-	1.76
F	Lygodesmia sp.	-	-	3	-	-	-	.01	-	-	-
F	Melilotus officinalis	-	-	-	-	-	1	-	-	-	.03

T y p e	Species	Nested Frequency						Average Cover %			
		'83	'89	'97	'02	'04	'07	'97	'02	'04	'07
F	<i>Medicago sativa</i>	-	-	-	-	-	1	-	-	-	.00
F	<i>Microsteris gracilis</i> (a)	-	-	<sub>a</sub> 1	<sub>a</sub> 4	<sub>a</sub> 1	<sub>a</sub> 4	.00	.01	.00	.01
F	<i>Phlox longifolia</i>	<sub>a</sub> 10	<sub>b</sub> 32	<sub>ab</sub> 24	<sub>ab</sub> 29	<sub>ab</sub> 21	<sub>b</sub> 40	.25	.16	.17	.53
F	<i>Ranunculus testiculatus</i> (a)	-	-	<sub>ab</sub> 154	<sub>a</sub> 122	<sub>ab</sub> 148	<sub>b</sub> 185	1.09	.44	1.28	1.48
F	<i>Tragopogon dubius</i>	-	-	<sub>a</sub> 7	-	-	<sub>a</sub> 1	.04	-	-	.00
F	<i>Zigadenus paniculatus</i>	-	-	<sub>a</sub> 1	<sub>a</sub> 2	<sub>a</sub> -	<sub>a</sub> 1	.03	.06	.00	.00
Total for Annual Forbs		0	0	194	162	182	399	1.45	0.80	1.69	4.39
Total for Perennial Forbs		68	134	130	49	38	239	2.28	0.47	0.25	4.64
Total for Forbs		68	134	324	211	220	638	3.73	1.27	1.94	9.04

Values with different subscript letters are significantly different at alpha = 0.10

#### BROWSE TRENDS --

Management unit 18A, Study no: 23

T y p e	Species	Strip Frequency				Average Cover %			
		'97	'02	'04	'07	'97	'02	'04	'07
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	64	77	65	76	11.78	9.55	9.73	11.48
B	<i>Chrysothamnus nauseosus</i> <i>albicaulis</i>	1	0	0	2	.03	-	-	-
B	<i>Chrysothamnus viscidiflorus</i> <i>viscidiflorus</i>	1	0	0	0	.00	-	-	-
B	<i>Gutierrezia sarothrae</i>	38	45	12	20	.34	2.18	.36	.62
B	<i>Juniperus osteosperma</i>	6	9	9	8	7.68	8.89	8.79	1.09
B	<i>Quercus gambelii</i>	0	0	0	1	-	-	-	-
Total for Browse		110	131	86	107	19.85	20.63	18.88	13.20

#### CANOPY COVER, LINE INTERCEPT --

Management unit 18A, Study no: 23

Species	Percent Cover			
	'97	'02	'04	'07
<i>Artemisia tridentata</i> <i>wyomingensis</i>	-	9.63	10.21	12.44
<i>Gutierrezia sarothrae</i>	-	1.43	.48	.40
<i>Juniperus osteosperma</i>	5.19	10.93	13.10	3.71

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 18A, Study no: 23

Species	Average leader growth (in)		
	'02	'04	'07
<i>Artemisia tridentata</i> <i>wyomingensis</i>	3.4	1.6	1.4

POINT-QUARTER TREE DATA --

Management unit 18A, Study no: 23

Species	Trees per Acre			Average diameter (in)		
	'02	'04	'07	'02	'04	'07
<i>Juniperus osteosperma</i>	72	73	68	7.1	12.3	6.4

BASIC COVER --

Management unit 18A, Study no: 23

Cover Type	Average Cover %					
	'83	'89	'97	'02	'04	'07
Vegetation	1.50	6.00	39.91	42.34	40.34	47.69
Rock	3.25	6.25	2.59	2.93	2.64	2.06
Pavement	1.25	10.00	5.13	5.51	5.60	4.85
Litter	63.50	53.75	43.77	37.09	42.76	39.32
Cryptogams	.25	3.75	10.16	12.06	6.88	2.56
Bare Ground	30.25	20.25	10.21	16.87	19.49	14.95

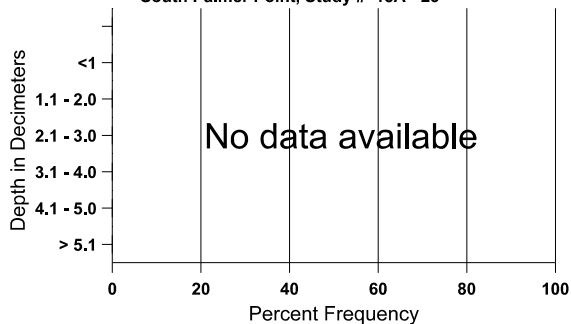
SOIL ANALYSIS DATA --

Herd Unit 18A, Study no: 23, South Palmer Point

Effective rooting depth (in)	Temp °F (depth)	pH	Loam			%0M	ppm P	ppm K	dS/m
			% sand	% silt	% clay				
-	-	7.9	42.0	33.1	24.9	2.1	3.4	259.2	.5

## Stoniness Index

South Palmer Point, Study # 18A - 23



PELLET GROUP DATA --

Management unit 18A, Study no: 23

Type	Quadrat Frequency			
	'97	'02	'04	'07
Rabbit	18	3	8	14
Elk	-	-	-	1
Deer	16	5	8	10
Cattle	2	-	-	-

Days use per acre (ha)		
'02	'04	'07
-	-	-
-	-	-
23 (56)	13 (31)	14 (35)
-	-	-

BROWSE CHARACTERISTICS --

Management unit 18A, Study no: 23

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
83	<b>2399</b>	66	33	1233	1133	-	29	69	47	-	47	19/26
89	<b>966</b>	-	66	100	800	-	83	0	83	-	72	39/29
97	<b>2420</b>	940	960	980	480	2200	14	0	20	9	12	28/45
02	<b>3820</b>	-	900	2200	720	1560	5	0	19	7	7	21/31
04	<b>2820</b>	-	180	1900	740	1360	12	0	26	11	11	20/27
07	<b>7200</b>	7200	4700	1960	540	580	11	2	8	3	4	22/30
<i>Chrysothamnus nauseosus albicaulis</i>												
83	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>20</b>	-	-	20	-	-	0	0	-	-	0	15/18
02	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
04	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
07	<b>40</b>	-	20	20	-	-	0	0	-	-	0	26/33
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
83	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>20</b>	-	20	-	-	-	0	0	-	-	0	6/5
02	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
04	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
07	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-



		Age class distribution (plants per acre)					Utilization					
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Gutierrezia sarothrae</i>												
83	<b>3199</b>	1966	1266	1933	-	-	0	0	0	-	0	9/11
89	<b>3732</b>	33	766	2933	33	-	0	0	1	-	3	13/14
97	<b>2520</b>	60	760	1760	-	60	3	0	0	-	0	7/6
02	<b>2600</b>	-	20	1840	740	800	0	0	28	6	6	8/11
04	<b>460</b>	-	-	380	80	480	0	0	17	13	13	8/11
07	<b>860</b>	80	180	660	20	20	0	0	2	2	2	7/9
<i>Juniperus osteosperma</i>												
83	<b>166</b>	66	33	133	-	-	0	0	0	-	0	62/44
89	<b>266</b>	-	200	66	-	-	0	0	0	-	0	335/118
97	<b>120</b>	40	20	100	-	-	0	0	0	-	0	-/-
02	<b>200</b>	20	60	140	-	-	0	0	0	-	0	-/-
04	<b>200</b>	-	80	120	-	-	0	0	0	-	0	-/-
07	<b>180</b>	40	140	-	40	20	0	0	22	11	11	-/-
<i>Quercus gambelii</i>												
83	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
02	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
04	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
07	<b>20</b>	-	20	-	-	-	0	0	-	-	0	-/-
<i>Rhus trilobata</i>												
83	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
02	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
04	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
07	<b>0</b>	20	-	-	-	-	0	0	-	-	0	-/-